

Modeling Mental Waves in Multidimensional Cognitive Spaces

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August 2025

Abstract

This essay presents an original proposal to represent mental processes through computational simulations of cognitive waves in a multidimensional space. Using a synthetic model developed in Python, we analyze the interactions between mental functions such as attention, intention, and coherence, projected onto symbolic, affective, structural, intuitive, and sensory dimensions. The goal is to visualize interference patterns that can be interpreted as cognitive activations.

1 Introduction

The human mind operates on multiple simultaneous levels, where each cognitive dimension contributes to the construction of conscious experience. This work proposes an analogy between mental functions and wave properties, allowing a dynamic representation of internal processes. Computational modeling of these waves offers a tool to explore the complexity of cognition from a visual and analytical perspective.

2 Theoretical Framework

The proposal is based on three conceptual pillars:

- Symbolic neurodynamics: oscillatory patterns that encode meanings and emotions.
- Cognitive dimensions: symbolic, affective, structural, intuitive, and sensory.
- Mental waves: attention, intention, and coherence as time-modulated functions.

3 Methodology

A Python-based model was developed to simulate sinusoidal waves with randomized parameters of frequency, phase, and amplitude. Each wave is projected onto a temporal axis and grouped by dimension. When the sum of intensities exceeds a predefined threshold, a cognitive activation is recorded. This approach allows observation of the mind's internal dynamics from a synthetic perspective, without relying on external empirical data.

4 Results

The model generated visualizations where interference patterns emerged at specific moments. The intuitive and affective dimensions showed a higher frequency of activations, suggesting a particular sensitivity to the overlap of mental functions. These activations are interpreted as moments of high cognitive load, potentially linked to states of concentration, internal conflict, or decision-making.

5 Discussion

The wave-based representation of cognition offers an alternative approach to studying the mind. Although the model is synthetic, its ability to generate emergent patterns makes it a useful tool for theoretical and experimental exploration. Future versions may integrate real neurobiological data and be adapted for educational, therapeutic, or cognitive design environments.

6 Conclusion

Modeling mental waves in multidimensional spaces provides an innovative way to visualize and analyze the internal dynamics of the mind. This computational approach, free from external references, constitutes an original proposal with potential applications in neuroscience, education, and cognitive design. The analogy between mental functions and wave phenomena opens new possibilities for understanding the complexity of human consciousness.

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